Australasian crested grebe - kāmana/kahaa/koukoa/ pūteketeke *(Podiceps cristatus australis)*

Threatened species conservation plan

June 2024

Christchurch City Council

Approvals Panel			
Author	**Andrew Crossland** Ecologist/Ornithologist Parks Planning	**Date** 12/03/2024	Signature 
Reviewed By	**Dr Antony Shadbolt** Team Leader – Biodiversity Parks Planning	**Date** 07/06/2024	Signature 
Approved By	**Kay Holder** Manager Regional Parks	**Date** 21/03/2024	Signature 

Contents

Introduction

This is a **threatened species conservation plan** for Australasian crested grebe *(Podiceps cristatus australis)* (Figure 1), an indigenous waterbird classified as "Threatened – Nationally Vulnerable" by the Department of Conservation and considered a taonga species by Ngai Tahu. This plan has been written to assist Christchurch City Council to meet its statutory obligations to halt the decline of indigenous biodiversity, and to assist with meeting two key goals and their associated objectives as set out in Council's Biodiversity Strategy 2008-2035:

Goal 1: Conserve and restore indigenous biodiversity in Christchurch and Banks Peninsula.

- ✓ Priority internationally, nationally and locally threatened species are protected and restored,
- ✓ Ecosystems, sites and habitats supporting biodiversity are protected and restored,
- ✓ Species and habitats important to Ngāi Tahu are protected, and where appropriate, restored, and
- ✓ Plant and animal pests are managed to minimise their impact on biodiversity.

Goal 4: Improve and facilitate research and monitoring of indigenous biodiversity.

- ✓ Monitoring programmes for the biodiversity of Christchurch and Banks Peninsula are established, coordinated and maintained,
- ✓ Biodiversity research is supported, coordinated and managed to enable sustainable management of biodiversity, and
- ✓ The community is involved in biodiversity research and monitoring. » Community attitudes to biodiversity are monitored.

Figure 1: *Australasian Crested Grebes*

"With careful management of disturbance and predator control it is foreseeable that crested grebes may one day return as a resident breeding species on many waterways in the Greater Christchurch area".

(Christchurch City Council Biodiversity Strategy 2008 - 2035, p.68)

The need for a conservation plan

The Australasian crested grebe has one of New Zealand's (and Australasia's) rarest waterbirds and has been classified as a threatened species for many years. The current designation is "Threatened – Nationally Vulnerable" which has been revised down from a long-standing earlier designation of "Threatened – Nationally Endangered".

Upwards of one-quarter of the entire New Zealand population winters in the Greater Christchurch area, particularly on Lake Forsyth/Te Roto o Wairewa. Protection of the wintering flocks through the provision of safe, food-rich habitats and the minimisation of disturbance and predation pressure is crucial for their autumn-winter survival and safe return to inland source areas. As such, Council and partners have an important role to play in the conservation of this species nationally.

A local breeding population (formed c.20 years ago) is still only tenuously established and vulnerable to local extinction. Threats include nest destruction through flooding or misplaced waterway maintenance activity in the breeding season; disturbance and predation; collisions with motorised watercraft; pollution and oil spills; accidental targeting of grebes during the gamebird hunting season; entanglement in flounder and eel nets; and also the mortality risks imposed by exposure to toxic algae blooms, avian botulism, and environmental toxins such as lead. However, if the recently established resident population is appropriately guarded and nurtured, then there's a good chance that the innovative and exploratory characteristics of colonising birds will have the potential to overcome barriers that have limited the recovery of long declining grebe populations in parts of the Canterbury high country. The new colonisers are exploratory rather than sedentary. They have adapted to a wider range of habitat types than high country grebes, including flowing rivers and brackish waters. They have become more tolerant of human disturbance - even habituated to living close to people and watercraft in some instances. They have available to them a sizeable network of lakes, ponds and rivers on to which they can expand. These habitats are free of winter ice and are rich in food resources.

National and local population trends

The first full national census recorded a total population of c.250 crested grebe in spring 1980, with 55% of these living in the Canterbury High Country (Sagar 1981). The national population has subsequently increased with more recent population estimates being 350 – 400 birds in 2004, and c.600 birds in 2012 (O'Donnell 2013; Heather & Robertson 2015). A new national census is scheduled for early 2024. A recent guestimate is that the population may have grown to close to 1000 birds (O'Donnell 2013/2022).

Local distribution

Within the Greater Christchurch area (lowland Central Canterbury) crested grebes are concentrated at lakes Forsyth and Ellesmere, as well as on waterbodies in north-west Christchurch and in Waimakariri District east of State H/W 1. Other sightings of vagrant or transient birds have been reported from southern and eastern Christchurch as well as around Rangiora and Lincoln (Figure 2). The veracity of eBird records at Port Levy and Akaroa Harbour are doubtful and likely relate to misidentified spotted shags or pied cormorants.

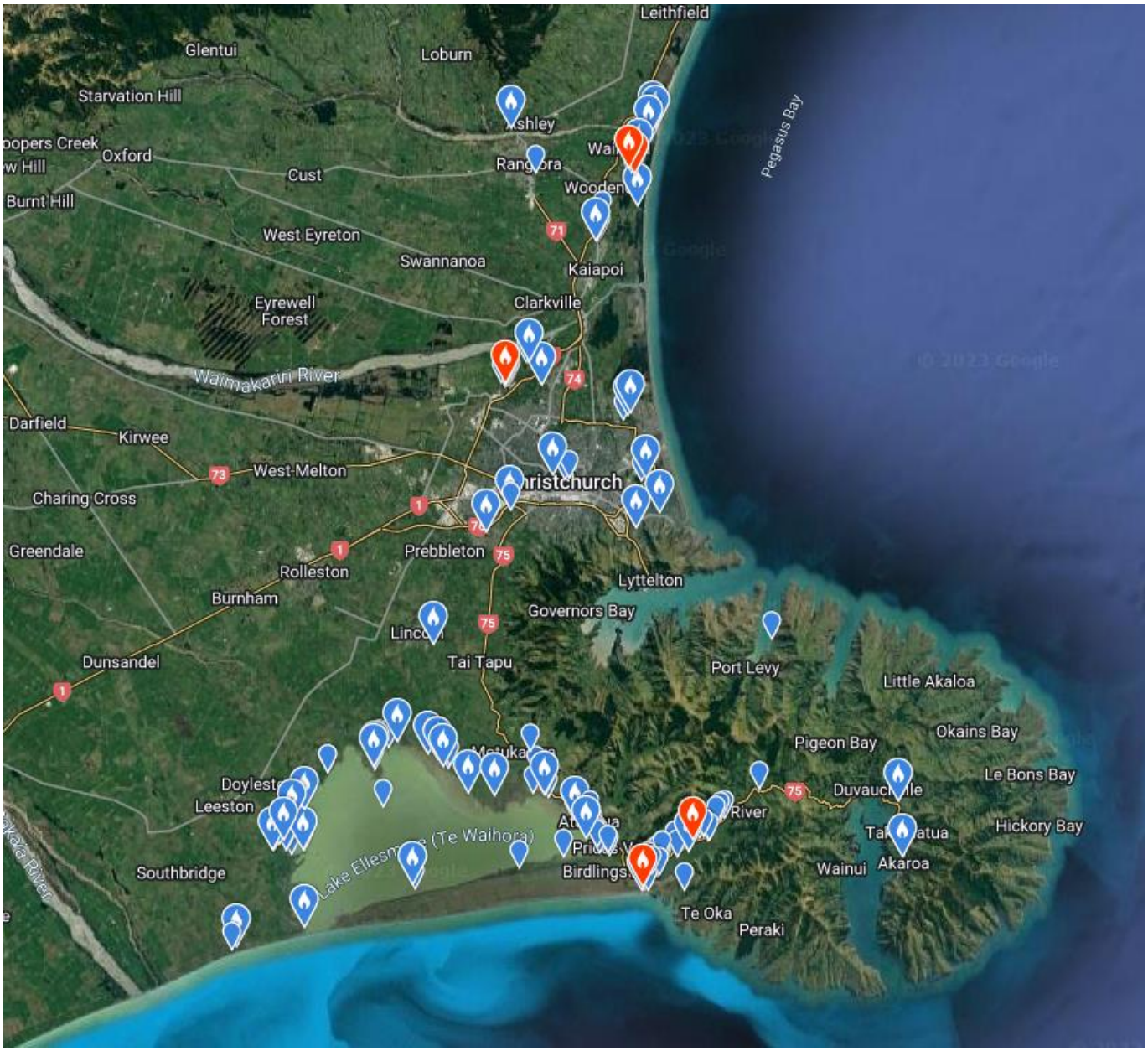

Figure 2: *Distribution of Australasian crested grebe sightings in lowland Central Canterbury © eBird, downloaded 28/6/2023.*

A fluctuating wintering population

Other than the rare occurrence of vagrant individuals, crested grebes were absent from lowland Canterbury for well over a century from c.1860s until 1987. In July 1987 - quite unexpectedly - a group of 20 grebes wintered on Lake Forsyth/Wairewa and an additional bird was observed at Kaituna lagoon, Lake Ellesmere/Te Waihora (O'Donnell 1988). A national census at the same time indicated that the birds had most likely come from Lake Alexandrina in the MacKenzie Basin - where exactly the same number were missing! Birds returned in 1988 and numbers grew steadily in most subsequent years until the flock exceeded 100 birds by the late 1980s and 200 birds by the mid 2000's. This Lake Forsyth winter flock peaked at 269 birds in 2012, which represented 45% of the total national population at that time. Census data requires collation for Lake Ellesmere (as it straddles two LGA districts and is difficult to survey), but the highest available winter count was 35 birds in 2009 (Table 1).

Table 1. *Peak winter census of Australasian crested grebe at Lake Ellesmere/Te Waihora 1987 - 2022*

Year	1987	2007	2009	2012	2013	2015	2017	2018	2019	2022	2023
Number	1	10	35	12	4	8	1	7	22	8	

Observers: Birds NZ/OSNZ, Christchurch City Council

For reasons unknown, wintering numbers declined during the mid-late 2010's with only 52 birds being recorded at Lake Forsyth and seven at Lake Ellesmere in 2015 (Table 2). One theory is that climate change has led to warmer winter conditions in the Canterbury High Country some years and a corresponding reduction in the extent of surface icing on mountain lakes. Possibly in years with warm winters more birds stay up in the mountains, while in the colder years they migrate to the coastal lowlands. This theory doesn't fit well however with the fact that through the early 2020's numbers have rapidly increased again. Another possibility is that environmental conditions in Lake Forsyth affect the abundance of the small fish that grebes feed on. Lake openings for example may generate changes in the abundance of fish species which migrate between the lake and the sea as part of their life cycles. Whatever the cause, peak grebe wintering numbers at Lake Forsyth doubled from 42 counted in 2019 to 107 in 2020, and then doubled again to 206 in 2022. They also seem to be increasing again at Lake Ellesmere (Refer Figure 3).

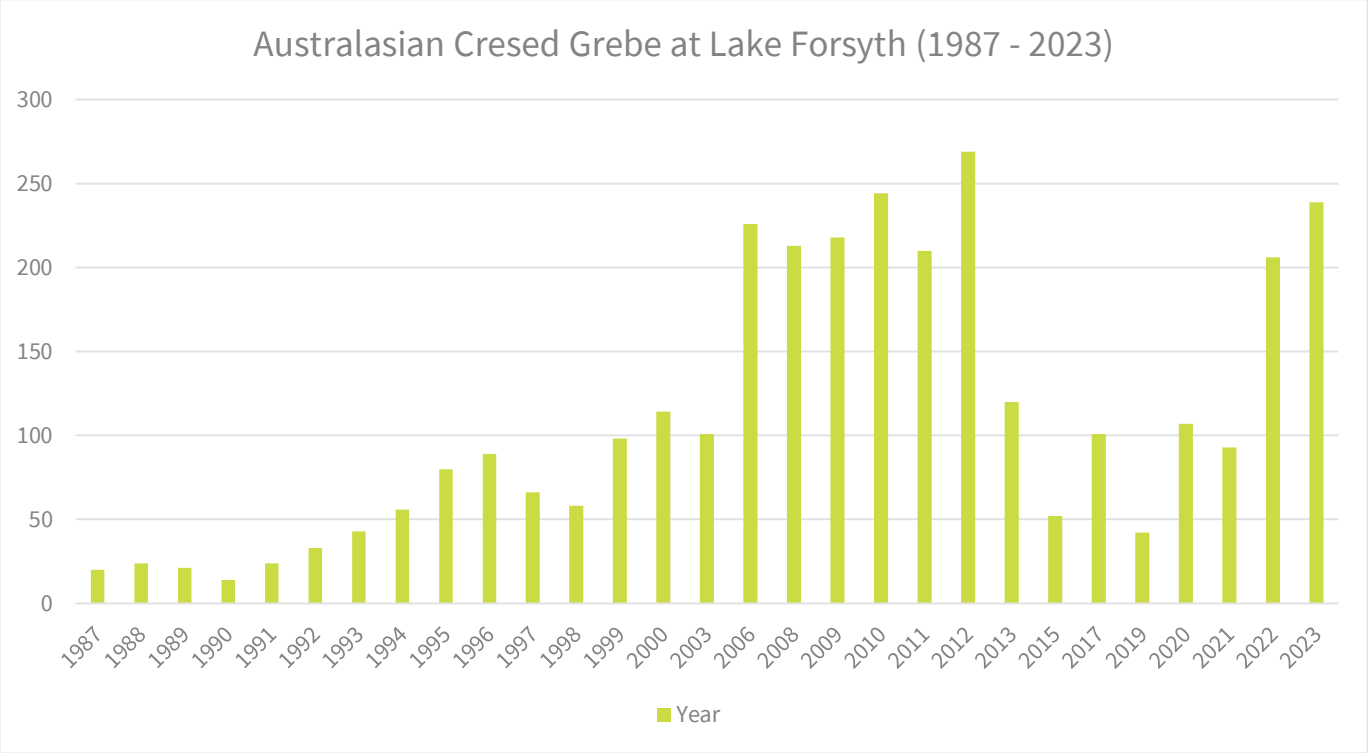

Figure 3: Peak winter census of Australasian crested grebe at Lake Forsyth/ Te Roto o Wairewa 1987 – 2023 (Observers: C.F.J. O'Donnell, S. Petch, K.C.H Harrison, J. Walker, N. Allen, S. Butcher, A. Crossland, N. Mugan, E Gunby, F. Gurney).

Crested grebes also winter on ponds and flooded shingle pits in Christchurch city (mostly in the north-west), as well as on similar habitats in neighbouring parts of the Waimakariri District. Collation of past counts and commencement of monitoring going forward are required to keep track of year-on-year (longitudinal) population trends, but the current wintering population on the Pegasus Bay lowlands is estimated at <30 birds.

An actively recolonising resident population

Australasian crested grebes had not been recorded nesting in the Canterbury lowlands right through last third of the 19th Century and the entire 20th Century. They seem to have recommenced breeding in the 2004-2005 breeding season when 3 pairs were observed on the Kaituna River (a tributary of Lake Ellesmere) and at least one pair on Lake Forsyth. This was a quite a surprise and a massive step forward for the national population recovery of this species. It meant opportunity for the recovery of the species through the formation of a new, geographically breeding discrete population; an expansion of breeding habitat preference from eastern South Island mountain lakes and Westland forested lakes, to more open coastal brackish lakes and slow-flowing rivers. These habitat preferences further broadened in the following years with crested grebes also colonising flooded shingle pits. The local breeding population remains small and is vulnerable to local extinctions, but the strong positives are that birds seem to tolerating living in close proximity to human activity (especially at Lake Roto Kohatu and Catons Bay, Lake Forsyth); the population is exploring the landscape and dispersing across multiple sites; breeding success is quite good some years; and there is regular opportunity for recruitment from high county birds migrating in for autumn-winter.

A co-ordinated post-breeding census of crested grebes was undertaken in lowland Central Canterbury in April 2023 by Council, WDC and SDC staff. The aim was to measure the size of the adult and fledged juvenile population. This census recorded a total of 212 birds, comprising none in the Hurunui District part of Pegasus Bay (seven sites surveyed); eight in the Waimakariri District lowlands (at two of 16 sites); 6 in north-west Christchurch (at one of 12 sites); none in east and central Christchurch (from 34 sites); none in south Christchurch (from 17 sites); 191 from Banks Peninsula (on one site – Lake Forsyth – from four sites surveyed); and none in the north-east part of Selwyn District (from 13 sites).

A regular census of breeding season populations in Christchurch and lowland Central Canterbury (at 1–5-year intervals) would be a very useful measure to track changes in the sub-regional population and of breeding populations at individual sites over time. The first opportunity to do this will be as part of national census scheduled for early 2024 (co-ordinated by Forest & Bird with other agency participation).

A careful review of data is required to back-fill the data set on crested grebe breeding populations in the Greater Christchurch area, but information available currently (Table 2) gives first breeding dates for various sites as: 2004-05 breeding season (Kaituna River & Lake Forsyth); 2006-2007 (Lake Ellesmere, City Council side); 2008-2009 (Clearwater Resort); 2009-2010 (Lake Roto Kohatu & the Okana River) and 2015-2016 (Lower Halswell River).

Table 2. Breeding populations on waterways within the Christchurch City Council District: numbers of breeding pairs and fledged young per breeding season (in brackets). Note: non-breeding birds present on these waterbodies are excluded. (n.d. = no data).

Breeding season	Lake Roto Kohatu	Clearwater Resort	Lower Halswell River	Kaituna River	Lake Ellesmere CCC side	Okana River	Lake Forsyth
2004 - 2005				3 pairs (?)			1 pair (?)
2005 - 2006				n.d.			n.d.
2006 - 2007				n.d.	1+ pair (?)	5 pairs	n.d.
2007 - 2008				5 pairs (?)	n.d.	n.d.	n.d.
2008 - 2009		1 pair (?)		n.d.	n.d.	2 pairs	8+ pair (?)
2009 - 2010	1 pair (3)	1 pair (3)		3 pairs	n.d.	7 pairs (?)	n.d.
2010 - 2011	1 pair (?)	1 pair (2)		5 pairs	n.d.	-5 pairs (?)	n.d.
2011 - 2012	n.d.	2 pairs (2)		n.d.	n.d.	n.d.	n.d.
2012 - 2013	1 pair (?)	1 pair (?)		n.d.	n.d.	5 pairs (?)	n.d.
2013 - 2014	1 pair (2)	2 pairs (?)		3 pairs (?)	n.d.	3 pairs (?)	7+ pairs (?)
2014 - 2015	1 pair (1)	n.d.		n.d.	n.d.	1 pair (?)	n.d.
2015 - 2016	2 pair (?)	0 pairs	1 pair (0)	n.d.	n.d.	1 pair (?)	n.d.
2016 - 2017	2 pairs (2)	0 pairs	0 pair	n.d.	n.d.	4 pairs (?)	n.d.
2017 - 2018	3 pairs (1)	n.d.	0 pair	n.d.	n.d.	n.d.	n.d.
2018 – 2019	3 pairs (7)	1 pair (2)	0 pair	n.d.	n.d.	0 pair	n.d.
2019 - 2020	2 pairs (3)	n.d.	0 pair	n.d.	n.d.	0 pair	n.d.
2020 - 2021	3 pairs (3)	n.d.	0 pair	n.d.	n.d.	n.d.	n.d.
2021 - 2022	3 pairs (3)	0 pair	0 pair	n.d.	n.d.	n.d.	n.d.
2022 - 2023	6 pairs (18)	0 pair	0 pair	n.d.	n.d.	0 pair	n.d.

Date sources: Christchurch City Council monitoring/OSNZ-Birds NZ/ebird/DoC Mahaanui

Biology

The Australasian crested grebe occurs in New Zealand and Australia and is a sub-species of the Great Crested Grebe, which is found throughout much of Europe and Asia, with another subspecies in Africa. The total international population of the Australasian sub-species is considered to number less than 3000 birds, and it is designated a threatened species in New Zealand and a rare species in parts of Australia (O'Donnell 2013).

In New Zealand crested grebes breed only in the South Island and are only very rarely recorded in the North Island. Following substantial range retraction during the early European colonial period, the species retreated to high country lakes on the eastern side of the South Island, Fiordland, and a small number of mainly lowland lakes in Westland (Sagar & O'Donnell 1982; Heather & Robertson 1996). In recent years the population has begun to recover, and the species first expanded its wintering range, and then its breeding range by initially recolonising the coastal lowlands in the Pegasus Bay/Banks Peninsula area. More recently they have begun recolonising lowland lakes in Marlborough. In autumn-winter, upwards of a quarter of the total New Zealand crested grebe population may be found living on a handful of waterbodies in the Greater Christchurch area, including Lake Forsyth/Te Roto o Wairewa, Lake Ellesmere/Te Waihora, Lake Roto Kohatu, Clearwater Golf Resort and several sites just north of Christchurch City in the lowland coastal part of Waimakariri District.

Identification

The Crested Grebe is among the most elegant and colourful of New Zealand's wetland birds. Males and females are similar in size and plumage and are distinguished by their relatively large, angular head with sharp-pointed bill, black double head crest and chestnut-grading-into-black cheek ruffs. From the side and from behind, adult crested grebes appear dark with a pale face, but otherwise dark plumage (Refer Figures 1 & 4 - 7).

Figure 4: *Adult Australasian crested grebe.*

Figure 5: *Crested grebe taking flight showing the extensive white wing patches on both upper and lower surfaces of the wing.*

From the front, adult grebes have a prominent white fore-neck, chest and belly (Refer Figures 6 & 7) so they can appear very pale, leading to identification confusion with spotted shags and cormorants at a distance (Refer Figure 8). Fledged chicks have black and white "zebra" markings on their head and neck (Figure 6), with pale undersides. Juveniles appear pale on the face, neck and undersides with darker plumage on the back and wings being a shade greyer than adults. At all ages the wing has a prominent white patch visible when the bird is flying. However, crested grebes are seldom observed in flight. They are highly reluctant to fly during the day and make most movements at night, including their migration flights between the high-country lakes and the lowlands around Christchurch.

Figure 6: *Adult (left) front view and juvenile (right).*

Figure 7: *Relative size of crested grebe compared to New Zealand scaup, a waterfowl species with which they commonly associate.*

Figure 8: *Comparison of crested grebe with confusion species in the Christchurch area (particularly when seen at a distance). Crested grebes (weight 1100g, length 50 cm) are a similar- sized but longer necked than a female mallard (1100 g, 56 cm); smaller than spotted shag (1200g, 70 cm) and pied cormorant (2000g, 81 cm); and larger than hoary-headed grebe (250g, 28 cm), NZ dabchick (250g, 29 cm) and Australasian Little grebe (220g, 25 cm – not shown).*

Key to images above:

spotted shag (juvenile)	*pied cormorant (juvenile)*	*crested grebe (fledged chick)*
spotted shag (adult)	*pied cormorant (adult)*	*crested grebe (adult)*
Hoary-headed grebe	*NZ dabchick*	*crested grebe (adult)*

Feeding ecology

Australasian crested grebes are highly aquatic and seldom come ashore. On lakes and rivers, they feed mostly on fish which they catch by diving and pursuit underwater swimming. On oxidation ponds where there are no fish they feed on aquatic insects and presumably also their larvae. Lake Forsyth, the principal wintering site for crested grebe in the Greater Christchurch area, has a high diversity and abundance of indigenous fish, as well as populations of brown trout and redfin perch (Cromarty & Scott 1996). Lake Roto Kohatu, an important breeding site for grebe supports brown trout and tench. Research is needed to gauge the importance of perch and tench as prey species supporting local wintering and breeding-season crested grebe populations.

Breeding ecology

Crested grebes breed from September to March and early nesters attending sizeable young may be present at the same time as later nesters still incubating eggs. This means that disturbance impacts and water levels at breeding sites will often need monitoring and management for a prolonged period during the breeding season.

Pairs are monogamous. One to seven eggs are typically laid with incubation lasting 25-31 days. Parents guard the chicks through the fledgling period and for a period beyond. Uniquely among New Zealand waterbirds, adults often carry young on their backs (Figures 9a & b).

Nests are platforms (Refer Figures 10a & b, and 11 a & b) made of sticks and plant material, most often built as a raft attached to an overhanging tree branch or within tall swamp vegetation (e.g., *raupo, Carex, juncus*), but nests can sometimes be a mound built in open ground on a lake shore or islands. Nesting rafts have been used successfully at some New Zealand lakes (most notably at Lake Wanaka), but trials in 2015-2016 on the Okana River (Davis Ogilvie 2015) were apparently not successful and were discontinued.

Figures 9a & b: *Crested grebe are unique among New Zealand's waterbirds in that they carry their young on their backs (photos © D. Rate-Smith)*


Figures 10a & b: *typical floating raft nests under cover of emergent vegetation and anchored to a tree trunk or branches.*


Figures 11a & b: *Less common examples of nest mounds located on open lakeshore (left) or amongst low cover (right).*

Autumn-winter movements

Traditionally in New Zealand, the species has been characterised largely as a sedentary resident of sub-alpine and alpine lakes through the inland parts of the South Island and a few lowland lakes in South Westland (Sagar 1981; Sagar & O'Donnell 1982). Local "within-catchment" seasonal movements were observed – primarily a congregation of scores of grebes on Lake Alexandrina in the Mackenzie Basin, but long-distance movements and deliberate migrations to the lowlands were unknown (O'Donnell 1988). Overseas however (including in Australia) populations of different crested grebe sub-species migratory and often winter on lowland and coastal wetlands, including brackish and tidal habitats (Marchant & Higgins 1990; Birdlife International 2023). These behaviours first occurred in New Zealand in 1987 - presumably by high country grebes changing their wintering strategy (CCC 2008), but possibly by the undetected arrival of Australian birds that simply continued pre-existing behaviours. This was the first occurrence of a flock of crested grebe in lowland Canterbury during the 20th Century, and also the first instance of apparent migration of the species within New Zealand.

Now, almost four decades since the reappearance of crested grebes at Lake Forsyth, the seasonal patterns of migration between high country and the Greater Christchurch area are firmly entrenched. Spending winter on Christchurch lowland coastal lakes provides many advantages for grebes, including an ice-free environment, abundant easily obtainable food resources, and lower energetic demands for winter survival.

Disadvantages include the risk of undertaking migration flight from the high country to the lowlands (a distance of 110 km from the Lake Coleridge area and up to 230 km from Lake Ohau area), as well as dangers present around Lakes Forsyth/ Lake Forsyth/Te Roto o Wairewa and Ellesmere/Te Waihora such as game-bird hunting; human disturbance, predation, and the risk of encountering toxic algae (although generally this is only an actual threat in summer).

Conservation goals

Council's Biodiversity Strategy 2008-2035 (p. 68) highlights the Australasian crested grebe and anticipates that Council's conservation management will be directed to benefit this priority threatened species.

Two key goals of the Biodiversity Strategy provide a mandate for monitoring populations of Australasian crested grebe and for undertaking actions to conserve and restore the species by way of a Threatened Species Conservation Plan:

> ***Goal 1:*** *Conserve and restore indigenous biodiversity in Christchurch and Banks Peninsula.*
>
> ***Goal 4:*** *Improve and facilitate research and monitoring of indigenous biodiversity.*

Appendix 1 outlines the objectives, implementation targets and implementation actions under Goals 1 and 2 that are relevant to conservation actions for Australasian Crested Grebe[1]. These provide the mandate for undertaking inventory and monitoring work; threat reduction and predator control, as well as advocacy for the benefit of crested grebes. Priorities have been determined as part of Council's Biodiversity Strategy consultation and decision-making process.

Short term goals

- To maintain favourable conditions into the future so that waterways in Greater Christchurch continue to support a sizeable proportion of the national crested grebe population each autumn-winter.
- To protect the local breeding population to help it to stabilise and become self-sustaining.

Long-term goal

- Help the core resident crested grebe population in Greater Christchurch grow significantly and spread out to other areas in the Canterbury Plains and foothills. This will follow the trajectories shown by populations of other assisted species (including New Zealand Scaup, Royal Spoonbill, Pied Cormorant, Little Black Cormorant and Bellbird) and would be another significant and tangible step in Council's efforts to assist wildlife in overcoming the impacts of the declared "climatic and ecological emergency".

[1] https://ccc.govt.nz/assets/Documents/The-Council/Plans-Strategies-Policies-Bylaws/Strategies/BiodiversityStrategy-3Part1Chapters7-9.pdf

Actions

Overall, a species conservation plan for the Australasian crested grebe in Greater Christchurch (and lowland Central Canterbury) should focus on protecting and enhancing habitat, mitigating threats, increasing public awareness, conducting monitoring & research, and promoting collaboration and coordination between Council and other territorial/regional authorities, DoC, Runanga and other stakeholders.

Monitor crested grebe breeding and winter populations

Regular monitoring of crested grebe populations should be carried out to assess the success of the conservation plan. This will involve counting the number of breeding pairs, juveniles, and non-breeding birds, monitoring winter flock sizes, mapping distribution, as well as identifying key threats to the population:

- ✓ Gather together pre-2023 monitoring data and observations from multiple sources to calculate population data and annual levels of breeding success prior to 2023. This will further refine the available data summarised in Tables 1 & 2. **High priority.**
- ✓ Implement a structured monitoring programme at breeding sites within the Council District to ascertain the number of pairs breeding per year and the number of chicks successfully fledged. Sites include Lake Forsyth, Lake Ellesmere, Okana River, Kaituna River, Lower Halswell River, Lake Roto Kohatu and Clearwater Resort, as well as any new sites colonised by crested grebes. **Very High priority.**
- ✓ Undertake bird counts over the peak winter flocking months of June, July and early August to obtain an accurate measure of peak winter numbers per year at Lakes Forsyth, Ellesmere and Roto Kohatu, as well as maintain an annual record of any grebes wintering on other sites within the Council District. **High priority.**
- ✓ Take a lead organisational and field survey role in working with key partners to undertake surveys of breeding and wintering populations of crested grebe across lowland Central Canterbury (Greater Christchurch) at intervals of 3-5 years. Key partners include WDC, SDC, ECAN, DoC, Runanga and organisations such as Birds NZ, Forest & Bird, Styx Living Laboratory, Waihora-Ellesmere Trust, etc. **High priority.**
- ✓ Participate and contribute data to region-wide and nation-wide census of crested grebes when they occur (likely at 10 year intervals). **High priority.**
- ✓ Undertake banding and satellite/GPS-tracking studies of crested grebes with the aim of determining longevity, movements, migration routes and source areas, etc. **Medium priority.**
- ✓ Research is crucial for understanding the ecology and behaviour of the crested grebe in lowland central Canterbury, which will differ in a number of respects from what grebes do in the Canterbury High Country. There is a need to undertake research to improve our knowledge of key local prey species and feeding ecology, breeding biology, local movements, and population dynamics. **Medium priority.**

Threat management

The main threats to the crested grebe in Greater Christchurch are thought to be habitat degradation, health risks imposed by toxic algae, disease & pollution (See Figures 12 and 13), human disturbance and predation. The conservation plan involves measures to assess and mitigate these threats:

Figure 12: *A flock of crested grebe at Caton's Bay, Lake Forsyth feeding and loafing behind a sign warning of high toxic algae risk.*

Figure 13: *A freshly dead adult crested grebe found on the shore of Lake Forsyth, 1 June 2015. Cause of death unknown.*

- ✓ Monitor breeding success at selected sites to better understand chick and fledging survival rates, and to obtain measures of predation on clutches, chicks and attendant adults. **High priority.**
- ✓ Identify key mammalian and avian predators and implement predator management programmes around breeding sites and the wider landscape. **Very High priority.**
- ✓ Reduce predator populations around wintering sites. **Medium priority.**
- ✓ Take measures to restrict harassment and disturbance of crested grebes by dogs. **High priority.**
- ✓ Manage recreational activities near breeding and winter flocking sites. This requires research into the apparent habituation of crested grebes to human shore-based and non-motorised water-based activity[2]. **High priority.**
- ✓ Monitor the interaction of jet skis and crested grebes at Lake Roto Kohatu and modify existing shared-use arrangements if found necessary. This issue has already been addressed in the management plan for the site and seems to be working well, but ongoing monitoring and adjustments are requirements. **Medium priority.**
- ✓ Work with Runanga, partner agencies and the New Brighton powerboat club to manage the interaction of motorised watercraft travelling at speed versus crested grebe at Lake Forsyth/Te Roto o Wairewa. This will require research into the disturbance impacts on breeding and wintering grebes; the extent of boat wash on nests and shoreline breeding habitats; ways to avoid birds being run over by fast-moving boats; and an assessment of the spatial extent and seasonal window/s over which power boat racing might occur with a low likelihood of disturbance to crested grebes (and other protected indigenous waterbirds and gamebirds). **High priority.**
- ✓ Investigate and manage possible disturbance impacts on crested grebes (including incidence of nest and brood desertion) of human activity in rivers where grebes breed (Kaituna, Okana, and lower Halswell

[2] This habituation is not only evident locally at Lake Roto Kohatu and Caton's Bay, but elsewhere at Wanaka, Queenstown, Te Anau, also. The ways in which grebes and humans can successfully co-exist seems to be quite nuanced and at variance with typical waterbird v human interaction.

Rivers). Activities include kayaking, angling, walking, habitat restoration work such as planting, spraying, mowing and weeding. **Medium priority.**

- ✓ Undertake an assessment of the risks imposed on crested grebes by waterfowl hunting and seek mitigations that minimise disturbance and accidental loss of birds. **Medium priority.**
- ✓ Evaluate the health impacts on grebes of toxic algae blooms in Lake Forsyth/Te Roto o Wairewa and Lake Ellesmere/Te Waihora and consider the survival of crested grebes and other wetland birds in the management of blooms. Do date there has been no evidence of unusual mortality of crested grebes during previous toxic algae blooms but the absence if monitoring and evaluation mean that negative impacts may be overlooked. **Medium priority.**
- ✓ Investigate the degree to which crested grebe may be dependent on exotic fish species like tench and perch and factor findings into any future fisheries management on Lakes Forsyth, Ellesmere and their tributaries. **Medium priority.**
- ✓ Investigate the impact of climate change on crested grebes and their prey species. **Medium priority.**

Habitat Management

Australasian crested grebes require suitable breeding and feeding habitats. Conservation efforts around habitat management should involve restoring and enhancing existing habitats, and creating new habitats where opportunity allows:

- ✓ Factor in the habitat requirements and conservation needs of crested grebe when developing management/development plans for sites where they currently regularly occur or where they can be expected to occur if the population continues to expand in the future. Sites where crested grebes are resident or of regular occurrence in the Council district are listed in Table 2. Additional sites where they currently occasionally and may colonise in the future are shown in Figure 2. These sites include: Travis Wetland, Styx Mill Basin Reserve, Wigram East Retention Basin, Bromley Oxidation Ponds, Westlake, Ferrymead Wetlands and the Avon River. **Medium priority.**
- ✓ Because the Christchurch crested grebe population is shared with the Waimakariri and Selwyn districts and grebes also occur on waterways and ponds/lakes managed by Environment Canterbury and Runanga, collaboration on research and development of good practise in the management of lowland grebe habitat shall be carried out. **Medium priority.**
- ✓ Monitor the impacts of water levels on crested grebe nesting at Lakes Forsyth and Ellesmere and their tributary waterways to better inform lake opening protocols for the benefit of crested grebes. **Medium priority.**
- ✓ Find ways to improve crested grebe breeding habitat quality extent within the Council district. Opportunities are likely to include expansion and enhancement of habitat within Council's Kaituna Rivermouth Reserve and establishment of further raupo tall swampland around the shores of Lake Forsyth. **High priority**
- ✓ Undertake assessments of crested grebe presence prior to vegetation maintenance, bank works, aquatic weed control and dredging on waterways and lake/pond shores known to be populated by crested grebes. Activities that destroy, damage or disturb occupied grebe breeding habitat during the breeding

season are unlawful. Activites in such areas outside the breeding season should be avoided as good practise. **Very high priority**

- ✓ Pre-works bird survey shall be carried out If works during the breeding season on riverbed/lakebed and riverbanks/lake edges where crested grebes are known to nest cannot be avoided. This should be either a consent condition or a protocol on works schedules. The survey should be carried out by a competent ornithologist who should map any confirmed or suspected nest (based on parent bird behaviours). No works should occur within 100m of a nest until breeding activity (eggs hatch, chicks swim away with parents), unless permission and guidance for a shorter buffer distance has been provided by DoC experts. **High priority**.
- ✓ Where possible, restrict human land-based and water-based recreational and other activity from 50 m of grebe nests. If this is not possible – such as along the Little River rail trail as it straddles the Okana Riverbank, investigate ways to protect grebe nests from disturbance (such as "no-stopping signage, denser screen planting developed over time, etc). **High priority**.
- ✓ Restrict usage of drones from within 50 m of active crested grebe nests. **Medium priority**.
- ✓ Trial artificial nest rafts for crested grebes in Lake Forsyth, Lake Ellesmere and on ponds in other parts of the city. Copy successful designs from Wanaka and other areas. Tails of rafts on the Kaituna river indicated that they are not suitable for flowing water however there is a string likelihood they'll be successful on flat water. **High priority**.

Promote awareness and support for protection of Australasian crested grebes

The crested grebe conservation plan should involve education and outreach activities to inform the community about the importance of crested grebe conservation and the actions they can take to help. Further elevation of crested grebe as an iconic indigenous waterbird species in Greater Christchurch should be encouraged and celebrated. The story of how this species shifted from a sedentary distribution where birds lived year-round on mountain lakes to a migratory pattern where a sizeable component of the entire national population now spends autumn/winter on Christchurch wetlands should be something which sparks people's enthusiasm and instils confidence that rare wildlife species in New Zealand's can make a comeback!

- ✓ Engage with Wairewa Rūnanga (kaitiaki of Te Roto o Wairewa and its tributaries) and Te Taumutu Rūnanga (kaitiaki of Te Waihora) around possible collaboration in research, monitoring and management of local crested grebe populations. Seek guidance on which Te Reo name for the species is the preference of each Rūnanga and ensure this is followed on signage, reportage etc. Accommodate Māori cultural knowledge, perspectives and aspirations in the conservation and management of crested grebes in the Christchurch area. **High priority**.
- ✓ Advocate for an appropriate threat status for Australasian crested grebe. The current setting seems appropriate. The recent down-grading of the threat classification from "Threatened – Nationally Endangered" to "Threatened – Nationally Vulnerable" is supported by Council given both the national population increase and range expansion over the last 30 years. **Medium priority**.
- ✓ Advocate for public recognition that crested grebe should have iconic status in Christchurch as one of several special bird species for which the city is noted famously noted (Bar-tailed Godwit, White-flippered Penguin, Royal Spoonbill and Black-billed Gull are others). **High priority**.

- ✓ Encourage community ownership in pride at the presence of crested grebe at some of the key locations where the species occurs locally. The obvious locations at this stage are Lake Forsyth/Little River and Lake Roto Kohatu/NW Christchurch. **Medium priority**
- ✓ Support the rescue and rehabilitation of sick or injured crested grebes, with fit birds released back into the wild within Greater Christchurch. **High priority**.
- ✓ Install appropriate signage at crested grebe breeding and winter flocking sites outlining the conservation importance of the species, explaining its ecology and out how people should behave around them. **High priority**.

Review Date

This Threatened Species Conservation Plan for Australasian crested grebe should be reviewed every 5-10 years.

References

BirdLife International. 2023. *Species factsheet: Podiceps cristatus.* Downloaded from http://datazone.birdlife.org/species/factsheet/great-crested-grebe-podiceps-cristatus.

Christchurch City Council. 2008. *Christchurch City Council Biodiversity Strategy 2008-2035*. CCC, Christchurch.

Cromarty, P. & D.A. Scott. 1996. *A Directory of Wetlands in New Zealand.* Wellington: Department of Conservation. IWRB, Ramsar Convention Bureau.

Davis Ogilvie. 2015. *Application for Resource Consent – Kaituna River, Banks Peninsula*. Unpubl. Report for Department of Conservation, August 2015. Christchurch.

Heather, B.D. & H.A. Robertson. 1996. *The Field guide to the Birds of New Zealand.* OSNZ/Viking, Auckland.

Heather, B.D. & H.A. Robertson. 2015. *The Field guide to the Birds of New Zealand, revised edition.* Penguin Books, Auckland.

Marchant, S. & P.J. Higgins (co-ordinating editors). 1990. *Handbook of Australian, New Zealand & Antarctic Birds. Volume 1, Ratites to Petrels*. Oxford University Press, Melbourne.

O'Donnell, C.F.J. 1988. *Southern Crested Grebes on a lowland lake in winter*. *Notornis 35*: 75-76.

O'Donnell, C.F.J. 2013 [updated 2022]. *Australasian Crested Grebe/Pūteketeke. In* Miskelly, C.M. (ed). *New Zealand Birds Online.* www.nzbirdsonline.org.nz

Robertson, H.A.; Baird, K.A.; Elliot, P.; Rooney, A.; Hitchmough, R.A.; McArthur, N.J.; Makan, T.D.; Miskelly, C.M.; O'Donnell, C.F.J.; Sagar, P.M.; Scofield, R.P.; Taylor, G.A. & P. Michel. 2021. *Conservation status of birds in Aotearoa New Zealand 2021. New Zealand Threat Classification Series 36.* Department of Conservation, Wellington. https://www.doc.govt.nz/globalassets/documents/science-and-technical/nztcs36entire.pdf

Sagar, P.M. 1981. *The distribution and numbers of Crested Grebe in New Zealand 1980*. *Notornis 28*: 301-310.

Sagar, P.M. & C.F.J. O'Donnell. 1982. *Seasonal Movements and population of Southern Crested Grebe in Canterbury. Notornis 29*: 143-149.

Appendix 1: Christchurch Biodiversity Strategy implementation targets and actions relevant for Australasian crested grebe

Goal 1 Objectives	Implementation target	Implementation actions	Priority
Objective1.1: Priority Internationally, nationally and locally threatened species are protected and restored.	**Target 1.1.1:** Nationally and locally threatened species are identified, prioritised and monitored for conservation.	**Action 1:** Surveys of Christchurch and Banks Peninsula indigenous plants and animals [including birds] are undertaken.	Very high
	Target 1.1.2: Plans are prepared and implemented for nationally and locally threatened species protection.	**Action 1:** Conservation plans are prepared for nationally and locally threatened species.	High
		Action 3: Protection measures are initiated for priority species. See Action 1 above and Targets 1.1.1 and 1.2.1.	Very High
Objective 1.2: Ecosystems, sites and habitats supporting biodiversity are protected and restored.	**Target 1.2.1:** Ecosystems, sites and habitats with indigenous species on Council and private land are identified, prioritised, protected and restored where appropriate	**Action 1:** Surveys are undertaken of habitats with indigenous plants, invertebrates, lizards and fish [including birds], with priority given to land environments with <10% indigenous cover.	Very high
		Action 2: An assessment and prioritisation of biodiversity on Council owned or managed land is undertaken.	Very high
		Action 3: Management plan(s) and or other legal mechanisms provide long term protection for priority biodiversity on Council land.	Very high
		Action 4: High priority biodiversity sites are purchased on Banks Peninsula (including the Port Hills), Kaitōrete Spit and the plains. See Strategy concept plans for initial options.	Very high

	Target 1.2.3: Management of biodiversity on private land is appropriately supported.	**Action 1:** Technical advice is made available to landowners. See Target 2.1.1. Action 2.	High
	Target 1.2.7: The relative costs and benefits of biodiversity restoration and protection projects are understood and projects prioritised on a City wide basis.	**Action 1:** Develop criteria and prioritise biodiversity restoration projects.	Very high
		Action 2: Assess the value and feasibility of mainland island sites within Christchurch City and Banks Peninsula for protection and potential reintroduction of indigenous species.	Very high
	Target 1.2.8: Ecosystem function is improved (including species restoration) to compensate for previous biodiversity losses and enhance remnant indigenous biodiversity	**Action 2:** Implement habitat restoration for priority sites on Council managed land. See Target 1.2.7 Action 1 and Target 1.2.8 Action 1.	Medium
		Action 3: Council works with Ngāi Tahu on species, habitat and ecosystem recovery programmes such as Kaupapa Kererū and Koukourārata Ki Uta Ki Tai, Te Roto o Te Roto o Wairewa Mahinga Kai Park and Te Waihora Mahinga Kai project	Very high
Objective1.3 Species and habitats important to Ngāi Tahu are protected and where appropriate restored.	**Target 1.3.1:** Council is familiar with the species and habitats important to Ngāi Tahu.	**Action 1:** Work with Ngāi Tahu to identify and prepare a database of sites and species within Christchurch and Banks Peninsula and establish appropriate systems to protect sensitive information pertaining to sites.	High

Objective1.4 Plant and animal pests are managed to minimise their impact on biodiversity.	**Target 1.4.1:** Pest management plans, policies and initiatives (internal and external), including for domestic animals on Council managed land, are prepared, contributed to, coordinated and implemented.	**Action 1:** A Council pest management strategy is developed.	Very high
		Action 3: Control of plant and animal pests is extended to new Council managed sites with priority on protecting nationally and locally threatened habitats and species.	Very high
		Action 4: Control of plant and animal pests is maintained on priority existing Council managed biodiversity sites with nationally important and or locally threatened habitats and species such as the species on the oxidation ponds.	Very high
Objective 1.5 New Council policy will take account of and be aligned with the goals and objectives of the biodiversity strategy.	**Target 1.5.1:** Strategies, bylaws and policy decisions will ensure that priority biodiversity is protected and maintained	**Action 1:** Council policy will take account of indigenous biodiversity priorities.	Very high
	Target 1.5.2: Council capital and operation programmes will ensure the continued protection of priority biodiversity.	**Action 1:** Biodiversity initiatives will be funded as appropriate in the LTCCP	Very high

Goal 4 Objectives	Implementation target	Implementation actions	Priority
Objective 4:1 Monitoring programmes for the biodiversity of Christchurch City are established, coordinated and maintained.	**Target 4.1.1:** Monitoring ensures biodiversity sites are appropriately managed and objectives for conservation and restoration are achieved.	**Action 1:** Council in partnership with other agencies develops and implements methods to measure the health of remnant and restored biodiversity	Medium
	Target 4.1.2: Monitoring programmes enable the viability and trends of priority ecosystems and species to be sufficiently understood to guide management actions.	**Action 1:** Monitoring programmes are maintained, and initiated where appropriate, to determine ecological change over the long term.	Very high
Objective 4.2: Biodiversity research is supported, facilitated, coordinated and managed to enable sustainable management of biodiversity.	**Target 4.2.1:** Research programmes enable the viability and trends of priority ecosystems and species to be sufficiently understood to guide management actions	**Action 1:** Research is undertaken on the maintenance of priority remnant habitats in areas with	High
	Target 4.2.3: Research programmes enable prioritisation of biodiversity protection and management.	**Action 1:** Biodiversity needs are prioritised and applied to research project objectives.	Very high
Objective 4.4: Community attitudes to biodiversity are monitored.	**Target 4.4.1:** Monitoring gauges community support and concerns about biodiversity.	**Action 1:** Resident surveys (formal and informal) are undertaken.	High
		Action 2: Council will engage with iwi, community groups, organisations and trusts to maintain and increase understanding of community attitudes, concerns and initiatives.	Very high

Andrew Crossland
ECOLOGIST/ORNITHOLOGIST
Parks Biodiversity Team
Parks & Asset Management
Christchurch City Council
PO Box 73011
Christchurch 8154

Phone: (03) 941 7571
Mobile: 027 434 1155
Email: andrew.crossland@ccc.govt.nz

Photo credits: A. Crossland unless stated.

ccc.govt.nz/parksbiodiversity

Christchurch City Council